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IS 6965 (1979): Switches for use in railway coaching stock
[ETD 14: Electrical Wiring Accessories]



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Indian Standard
SPECIFICATION FOR SWITCHES
FOR USE IN RAILWAY COACHING STOCK

(First Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002



AMENDMENT NO. 1 APRIL 1985

TO

IS:6965-1979 SPECIFICATION FOR SWITCHES FOR USE IN
RAILWAY COACHING STOCK

(First Revision)

(Page 6, Fig. 1):

- a) *Fig. 1A Switch* - Delete dimension '30' and substitute '40' for dimension '38.'
- b) *NOTE 1* – Substitute the following for the existing matter:

NOTE – 1 'ON' sign to be moulded/engraved on the dolly in such a way so that it is visible when the switch is in 'ON' position after the cover plate is fixed.

- c) *NOTE 5* – Substitute the following for the existing matter:

'The minimum clearance of 3 mm shall be maintained between switch plate and any live part. However, if metallic switch plate is used and clearance is less than 10 mm suitable insulation will be provided on the inside face of the switch plate.'

(Page 9, clause 10.2) – Substitute the following for the existing matter:

'The 'ON' sign moulded or engraved on the dolly of

the switch shall be clearly risible when the circuit is closed. The engraved (sunk-in) letters should be 4 mm high and 3 mm wide and shall be adequately deep and filled with white epoxy/acrylic based paint."

(*Page 13, clause 11.9, line 3*) – Substitute '12 500' for '25 000'.

(ETDC 44)

Indian Standard

SPECIFICATION FOR SWITCHES FOR USE IN RAILWAY COACHING STOCK

(First Revision)

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IS : 6965-1979

(Continued from page 1)

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Indian Standard

SPECIFICATION FOR SWITCHES
FOR USE IN RAILWAY COACHING STOCK
(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 28 February 1979, after the draft finalized by the Electrical Wiring Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard was originally published in 1973. It has now been revised:

- a) to extend the range to 140 V ac and dc circuits, and
- b) to take into account the experience gained since the publication of the earlier version.

0.3 The switches covered by this standard are suitable for use with aluminium conductor cables of largest size 7/0.85 mm, which has a maximum diameter over the conductor of 2.6 mm.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard,

1. SCOPE

1.1 This standard specifies requirements for manually operated flush type switches for wall mounting, for use in railway coaching stock, having a rating of 5 A and suitable for use in ac and dc resistive and inductive circuits at normal rated voltage of 140 V.

*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Switch — A device designed to close or open one or more electric circuits.

2.2 Switch-Plate — A plate designed for covering a flush type switch and box.

2.3 Single-Pole Switch — A switch with one pole.

2.4 Pillar Type Terminal — A terminal in which the conductor is covered in a hole or slot by pressure from a screw, the axis of which is at an angle to the conductor.

2.5 Pole — A conducting path in a switch equipped with a set of contacts for making, breaking and carrying the normal current through the switch.

2.6 Actuating Member — That part of a switch which is moved, pulled, pushed or turned to operate the switch actuating mechanism. It is also known as dolly.

2.7 Flush Type Switch — A switch for mounting behind or incorporated with switch-plate, the back of the plate being flush with the surface of the wall or switch box.

2.8 One-Way Switch — A switch capable of making and breaking a single circuit only

2.9 Type Tests — Tests carried out to prove that the switch conforms to the requirements of this specification. These are intended to prove general qualities and design of the switch.

2.10 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

2.11 Routine Tests — Tests carried out on every switch to check requirements likely to vary during production.

3. CLASSIFICATION

3.1 The switches covered by this specification shall be classified as single-pole one-way switches.

4. CURRENT RATING

4.1 Current rating shall be 5 A.

5. MATERIAL

5.1 The switch parts shall be manufactured with the materials specified in Table 1.

TABLE 1 MATERIALS FOR SWITCH PARTS

(Clause 5.1)

SL No.	PART	MATERIAL
(1)	(2)	(3)
i)	Base and dolly	Phenolic moulding material conforming to Grade 3 of IS : 1300-1966*, to Indian Standard Colour No. 220 Olive green (see IS : 5-1978†)
ii)	Current-carrying parts	Copper/copper alloy/aluminium alloy
iii)	Springs	Steel conforming to IS : 4454 (Parts I-IV)‡
iv)	Attachment fittings, screws and other non-current-carrying parts	Mild steel

*Specification for phenolic moulding materials (*second revision*).†Colours for ready mixed paints and enamels (*third revision*).

‡Specification for steel wires for cold formed springs.

5.2 Phenolic moulding material conforming to Grade 3 of IS : 1300-1966* should be suitable for maximum continuous working temperature of 175°C and shall be resistant to tracking under normal use.

NOTE —The test for tracking (see 11.17) is intended to be carried out by the manufacturer for proper selection of the raw material.

5.3 Parts made of ferrous material shall be suitably protected by zinc or cadmium plating and bright passivating as specified below.

5.3.1 Portions other than the threaded ones of the parts made of ferrous material shall be plated and passivated according to Service Grade No. 3 of IS : 1573-1970† or 2 of IS : 1572-1968‡.

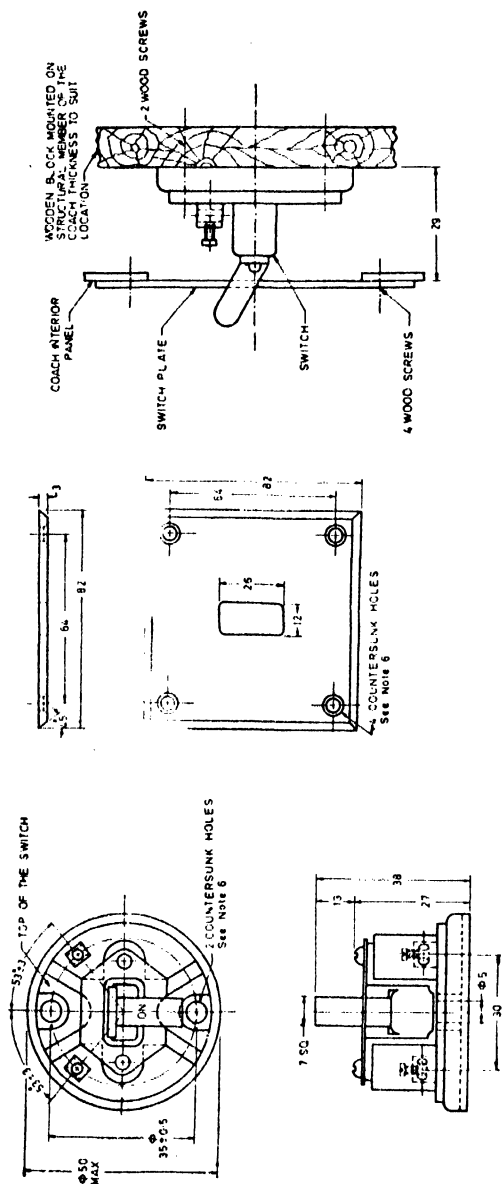
5.3.2 Threaded portions of the parts made of ferrous material shall be protected as agreed to between the manufacturer and the purchaser.

6. CONSTRUCTION

6.1 The switch shall conform to the details given in Fig. 1.

6.2 The current-carrying parts shall be of robust construction, resistant to corrosion and capable of carrying their rated current.

*Specification for phenolic moulding materials (*second revision*).†Specification for electroplated coatings of zinc on iron and steel (*first revision*).‡Specification for electroplated coatings of cadmium on iron and steel (*first revision*).

**1A Switch**

NOTE 1 — 'ON' sign to be moulded on the dolly in such a way that it is visible when the switch is in 'ON' position after the cover plate is fixed.

NOTE 2 — The switch shall have no cover.

NOTE 3 — No tapped holes shall be provided for fixing cover.

NOTE 4 — The switch shall be supplied without switch plate.

NOTE 5 — The minimum clearance of 10 mm shall be maintained between the switch plate and any live part.

NOTE 6 — All fixing holes shall be 90° countersunk holes having bottom diameter 5 mm and top diameter 8 mm, for screw AM 4 conforming to IS : 1365-1968 'Specification for slotted countersunk head and slotted raised countersunk head screws (diameter range 1.6 to 20 mm) (second revision)' or Screw No. 6 conforming to IS : 6760-1972 'Specification for slotted countersunk head wood screws'.

All dimensions in millimetres.

FIG. 1 CONSTRUCTION AND MOUNTING DETAILS OF SWITCH

7. TERMINALS AND SCREWS

7.1 Terminals — The material, design and proportion of all terminals shall be such that the connections made thereto do not slacken or over-heat under normal conditions of use. They shall allow a conductor to be connected without special preparations such as soldering of strands, use of cable lugs and formation of eyelets.

7.1.1 The terminals shall be designed to clamp the conductor between metal surfaces with sufficient contact pressure and without damage to the conductor.

7.1.2 All terminals shall be of sufficient size with respect to the rated current of the switch and size of conductor specified in 0.3.

7.1.3 All connections shall be made in such a way that the strands of the conductor are prevented from slipping or spreading at the terminal.

7.1.4 The terminals shall be so located that, provided the conductors are correctly fitted, there is no risk of accidental contact between live parts of different polarity or between such parts and accessible metal parts.

7.1.5 The terminals shall be suitable for cable entry from the front (top) of the switch.

7.1.6 The terminals shall have the dimensions given in Table 2.

7.2 Screws

7.2.1 Terminal screws used for gripping conductors shall be chamfered so that they do not cut into aluminium conductor cables. The screw head shall be approachable from the front. The screws shall be in accordance with IS: 1366-1968*.

7.2.2 Screwed connections electrical or otherwise, shall withstand the mechanical stresses occurring in normal use.

7.2.3 Screws transmitting contact pressure and those operated while the switches are being mounted and connected and having a nominal diameter less than 3.5 mm, shall screw into a metal nut or metal insert.

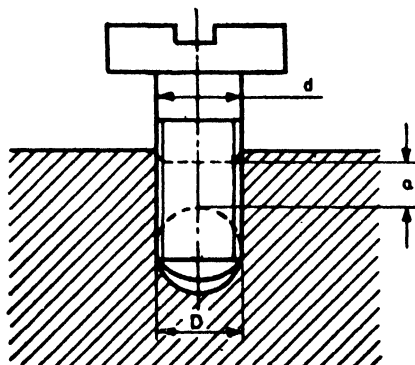
7.2.4 Other screws, which are operated while the switches are being mounted and connected, shall not be of the self-tapping type.

*Specification for slotted cheese head screws (dia range 1.6 to 20 mm) (*first revision*)

TABLE 2 DIMENSIONS OF TERMINALS

(Clause 7.1.6)

All dimensions in millimetres.



RATED CURRENT IN AMPERES	NOMINAL SCREW DIAMETER d	DIAMETER OF HOLES FOR CONDUCTOR D	LENGTH OF TAPPED HOLE a <i>Min</i>
(1)	(2)	(3)	(4)
5	3.5 ± 0.05	3.5	2.5

8. ACTUATING MECHANISM

8.1 The actuating mechanism shall be sufficiently strong to withstand all normal usage encountered in service.

8.2 An insulated actuating member having internal metal support or reinforcement shall be so constructed that in no case the reinforcement or support shall get energized by coming into contact with live parts even if the insulation is broken or detached.

8.3 The actuating mechanism shall be such that it is impossible to avoid a quick make and break, however slow the actuating mechanism is moved.

8.4 The actuating member shall be operated from 'off' to 'on' position and from 'on' to 'off' position by a steady. 'pull' and 'push' not exceeding 9.81 N, the force being applied parallel to the base.

9. CREEPAGE DISTANCES AND CLEARANCES

9.1 The creepage distances and clearances shall be not less than the values specified in Table 3.

TABLE 3 CREEPAGE DISTANCES AND CLEARANCES*(Clause 9.1)*

SL No.	PART	CREEPAGE DISTANCE	CLEARANCE
(1)	(2)	(3) mm	(4) mm
i)	Between live parts which are separated when the contacts are open	3.0	3.0
ii)	Between live parts and earth	3.0	3.0
iii)	Between live parts and accessible metal parts or screws used for fixing the base or metal parts of the mechanism if required to be insulated	3.0	—
iv)	Between live parts and the surface on which the switch is mounted	—	3.0

NOTE — Gaps or grooves less than 1 mm wide are ignored when measuring creepage distance.

10. MARKING

10.1 Every switch shall have the following information clearly and indelibly marked on it:

- a) Voltage rating, namely, 140 V;
- b) Current rating, namely, 5 A;
- c) Manufacturer's name and/or trade-mark;
- d) Country of manufacture; and
- e) Any other marking/information agreed to between the manufacturer and the purchaser.

10.2 The 'ON' sign moulded on the dolly of the switch shall be clearly visible when the circuit is closed.

10.3 The switches may also be marked with the Standard Mark.

10.3.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

11. TESTS

11.1 Classification of Tests

11.1.1 Type Tests — The following shall be carried out as type tests on samples of switches selected preferably at random from a regular production lot:

- a) Visual examination (11.3),
- b) High voltage test (11.4),
- c) Test for insulation resistance (dry) (11.5),
- d) Test for moisture resistance (11.6),
- e) Test for contact resistance and temperature-rise (11.7),
- f) Test for overvoltage and overcurrent capacity (11.8),
- g) Endurance test (11.9),
- h) Test for serviceability in ac inductive circuits (11.10),
- j) Test on screws and connections (11.11),
- k) Test for mechanical strength (11.12),
- m) Test for 'push' and 'pull' on the actuating mechanism (11.13),
- n) Test for water absorption (11.14),
- p) Test for resistance to heat (11.15), and
- q) Test for resistance to rusting (11.16).

11.1.1.1 Number of samples shall be five, all being subjected to the tests specified in 11.1 in the order specified therein.

11.1.1.2 Criteria for approval — All samples subjected to the type tests shall pass all the tests for proving conformity with the requirements of this standard. If one or more failures occur, the testing authority, at its discretion, may call for twice the original number of samples and subject them to all tests or to those in which failure occurred. No single failure shall be permitted in the repeat test(s).

11.1.2 Acceptance Tests — The following shall constitute acceptance tests:

- a) Visual examination (11.3),
- b) High voltage test (11.4),
- c) Test for insulation resistance (dry) (11.5),
- d) Test for moisture resistance (11.6),
- e) Test for contact resistance and temperature-rise (11.7),

- f) Test for overvoltage and overcurrent capacity (11.8),
- g) Test for serviceability in ac and dc inductive circuits (11.10), and
- h) Test for mechanical strength (11.12).

11.1.2.1 A recommended sampling procedure for acceptance tests is specified in Appendix A.

11.1.3 Routine Tests — The following shall constitute routine tests:

- a) Visual examination (11.3),
- b) High voltage test (11.4), and
- c) Test for insulation resistance (dry) (11.5).

11.2 General Conditions for Tests

11.2.1 The switch shall be mounted and connected as in actual working installation.

11.2.2 Unless otherwise specified, the tests shall be carried out under prevailing atmospheric conditions.

11.2.3 Switches intended for use on both ac and dc circuits shall be tested in non-inductive dc circuit.

11.2.4 In case of prolonged tests, lubrication of switches and their parts shall be permissible.

11.2.5 Switching Cycle — For the purpose of tests according to this specification, a switching cycle shall comprise the complete movement of the actuating member of the switch from any one normal position to the next and back.

11.3 Visual Examination — Each switch shall be visually examined for compliance with the relevant requirements of 6 and 10.

11.4 High Voltage Test

11.4.1 The switch shall satisfactorily withstand an ac voltage of 1500 V rms for a period of 1 minute:

- a) between poles and earth, with the switch closed;
- b) between each pole and earth, with the switch Open; and
- c) across poles, with the switch open.

11.4.1.1 The test voltage shall be approximately of sine-wave form having any convenient frequency between 40 and 60 Hz.

11.4.1.2 The test voltage shall be applied gradually. The initial voltage shall not exceed 30 percent of the full test voltage and shall be increased uniformly to the full voltage within 30 seconds. The full test voltage shall be maintained for 1 minute after which the voltage shall be diminished rapidly to 30 percent of its full value before switching it off.

11.4.2 Immediately following the high voltage test, the insulation resistance (dry) shall be measured in accordance with **11.5**.

11.4.3 *Flask Test* — As a routine test, the high voltage test may be carried out in the form of flash test, an ac voltage of 1500 V rms being applied for a period of 5 seconds between the parts specified in **11.4.1** without arcing.

11.5 Test for Insulation Resistance (Dry)

11.5.1 This test may be carried out at prevailing atmospheric conditions with relative humidity not exceeding 80 percent.

11.5.2 The insulation resistance (dry) shall be measured at a voltage of 500 V dc after 1 minute of electrification:

- a) across poles, with the switch open; and
- b) between live parts and any other metal parts insulated therefrom, including earthing terminals, with the switch closed.

11.5.3 The insulation resistance thus measured shall be not less than 100 megohms.

11.6 Test for Moisture Resistance

11.6.1 The switch shall be subjected to a moisture treatment for a period of 24 hours by keeping it in a humidity chamber in which the relative humidity is not less than 90 percent at a temperature of $27 \pm 2^\circ\text{C}$.

11.6.2 The insulation resistance shall then be measured within 2 to 3 minutes of the removal of the switch from the conditioning chamber in accordance with **11.5**.

11.6.3 The insulation resistance so measured shall be not less than 2.0 megohms.

11.7 Test for Contact Resistance and Temperature-Rise — The switches, when new and after half the specified number of switching cycles for the endurance test (see **11.9**), shall be capable of carrying their rated current for 30 minutes without the voltage drop between the terminals exceeding 0.075 V and without the temperature-rise of any part exceeding 25°C .

11.7.1 For the purpose of this test, the covers, if any, of the switches shall be in position, and conductors of adequate current-carrying capacity shall be connected to the switch terminals. For wall switches, the conductors shall be bunched together for a distance of 1 m from the cable entry which shall be plugged to prevent the free circulation of air.

11.7.2 The temperature-rise shall be measured by thermocouples or by other equally effective means of measurement. Thermometers may be used provided they are readable without opening the enclosures and do not materially affect the temperature-rise of the parts to which they are attached.

11.8 Test for Overvoltage and Overcurrent Capacity — The switches, when new and after half the specified number of switch cycles for the endurance test (see **11.9**), shall be capable of making and breaking 130 percent of the rated current at 185 V dc, 10 times in succession, at intervals of 30 seconds, without becoming unserviceable.

11.9 Endurance Test — The switches shall be capable of making and breaking electrical circuit at the rated dc voltage and the rated current specified in **1.1** for 25000 switch cycles, at a rate not exceeding 6 switch cycles per minute at regular intervals.

11.10 Test for Serviceability in ac Inductive Circuits — Each switch shall be capable of making and breaking not less than 125 percent of the rated current at a voltage not less than 110 percent of the rated voltage at 0.3 power factor (lagging), 100 times at a rate of approximately 7.5 switch cycles per minute, without becoming unserviceable.

11.11 Test on Screws and Connections — The screws which may be operated in the normal use shall be tightened and loosened as follows by means of a suitable test screwdriver applying a torque indicated in Table 4:

- a) Five times for screws operating in an internal thread in metal; and
- b) Ten times for screws operating in an internal thread in insulating material, the screws each time being completely removed and reinstated.

11.11.1 In the case of tests on terminal screws, a conductor of suitable cross-sectional area shall be placed in the terminal during the testing of the terminal screws. The conductor shall be slightly shifted after each operation. During this test, no damage impairing the further use of screwed connections shall occur.

11.11.2 The shape of the blade of the test screwdriver shall suit the slot of the screw to be tested.

TABLE 4 TORQUE

(Clauses 11.11 and B-1.4)

DIAMETER OF SCREW*	TORQUE IN Nm	
	Screws Without Head†	Other Screws
(1) mm	(2)	(3)
3.0	0.25	0.5
3.5	0.4	0.8
4.0	0.7	1.2
5.0	0.8	2.0
6.0	—	2.5

*see IS : 4218 (Part III)-1967 ISO metric screw threads: Part III Basic dimensions for design profiles.

†This also includes screws which do not protrude from the holes when tightened.

11.11.3 The screw shall not be tightened in jerks.

11.12 Test for Mechanical Strength

11.12.1 The switches shall be mounted on the support as in normal use and subjected to blows from a suitable impact test apparatus (see Appendix B).

11.12.2 To the actuating member 100 blows shall be applied and all positions of the actuating member shall be tested. The impact energy of each blow shall be 0.25 Nm.

11.12.3 During the test, cracks may appear and small pieces may become detached. However, if the external parts can be removed and replaced and the protection against electric shock is not impaired, the switch shall be deemed to have passed the test.

11.13 Test for 'Push' and 'Pull' on the Actuating Mechanism

11.13.1 The arrangement for this test shall be in accordance with Fig. 2.

11.13.1.1 The switch under test is mounted on a timber base-board and is covered by switch plate as would normally be done when the switch is fitted in a railway coach. The holes in the plate are slotted for adjustment on the mounting frame, to achieve free movement of the actuating mechanism. The actuating knob of the switch is pulled downwards by a sliding plate which moves in a guide. The sliding plate is fastened to one end of a spring balance. The other end of the balance is

fastened to a screw and nut tensioning arrangement. The tensioning arrangement is also capable of adjustment on the timber base-board. The base-board may be secured vertically on wall or on a stand.

11.13.2 The test procedure and the requirements are under consideration.

11.14 Test for Water Absorption

11.14.1 The switch parts made of moulded insulating materials, from which metallic portion have been removed, shall be broken into pieces of size within the range of 6 to 12 mm. A number of these pieces, weighing between 40 and 50 g, shall be taken for testing.

NOTE — Should it be not possible to have a sample of broken moulded insulating material weighing 40 to 50 g for carrying out water absorption tests, the testing authority at its discretion may choose to have smaller size of sample, depending upon the actual condition. The actual quantity used shall be mentioned in the test report.

11.14.2 The test pieces shall be heated to $50 \pm 3^{\circ}\text{C}$ for 24 hours for driving away the residual moisture.

11.14.3 The conditioned test pieces shall be weighed and immersed in distilled water for 24 hours. The pieces shall then be taken out of water, and the residual drops of water shall be removed by rolling them over a piece of filter paper or dry cloth.

11.14.4 The test pieces shall be reweighed to the nearest milligram within 10 minutes of their removal from the water.

11.14.5 The percentage of water absorption shall be calculated from these measurements.

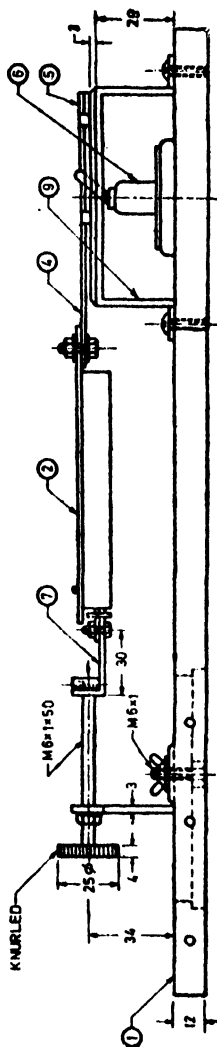
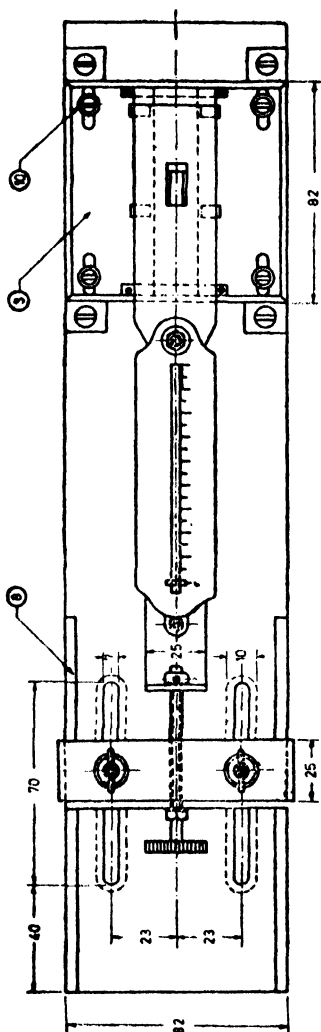
11.14.6 The moulded insulating material shall not have absorbed more than 1.0 percent of water.

11.15 Test for Resistance to Heat

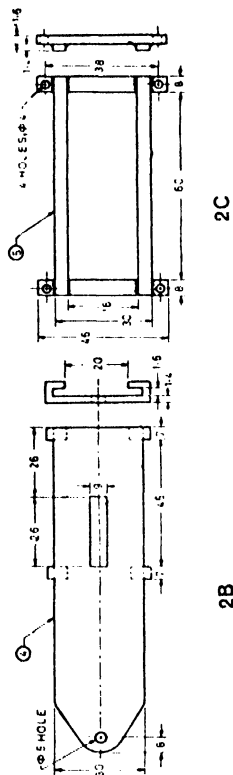
11.15.1 The sample shall be kept in a heating cabinet at a temperature of $100 \pm 5^{\circ}\text{C}$ for a period of 1 hour. The sample shall not undergo any change impairing its further use and sealing compound shall not flow to such an extent that live parts are exposed.

11.15.2 Switch bases, external parts of enclosed switches and cover plates, if any, of unenclosed switches shall be subjected to a ball-pressure test by means of the apparatus shown in Fig. 3.

11.15.2.1 The surface of the part to be tested shall be placed in the horizontal position and a steel ball of 5 mm diameter pressed against this surface by a force of 20 N.



2A



1. Base-board (timber)
2. Spring balance 2 kg capacity
3. Switch plate
4. Sliding plate (see Fig. 2B)
5. Guide for sliding plate (see Fig. 2C)
6. Test sample of switch
7. Connecting link
8. Angle $10 \times 10 \times 1130$
9. Frame
10. Self-tapping screw

All dimensions in millimetres.

FIG. 2 MECHANISM FOR TEST FOR 'PUSH' AND 'PULL' ON
ACTUATING MECHANISM

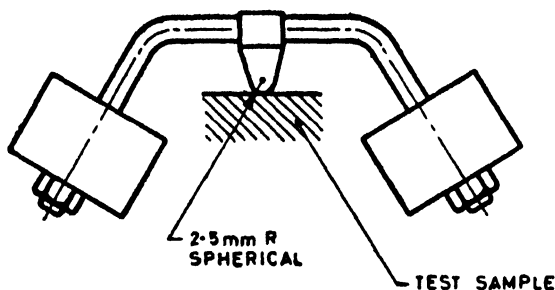


FIG. 3 BALL-PRESSURE APPARATUS

11.15.2.2 The test shall be made in a heating cabinet at a temperature of $125 \pm 5^\circ\text{C}$.

11.15.2.3 After 1 hour, the ball shall be removed and the diameter of the impression measured. The diameter shall not exceed 2 mm.

11.16 Test for Resistance to Rusting

11.16.1 All ferrous parts shall be subjected to this test.

11.16.2 All greases shall be removed from the parts to be tested by immersion in carbon tetrachloride for 10 minutes. The parts shall then be immersed for 10 minutes in an aqueous solution of 10 percent ammonium chloride at a temperature of $27 \pm 5^\circ\text{C}$.

11.16.3 Without drying, but after shaking off any drops of the solution, the parts shall be placed for 10 minutes in a box containing air saturated with moisture at a temperature of $27 \pm 5^\circ\text{C}$. These shall then be dried for 10 minutes in a heating cabinet at a temperature of $100 \pm 5^\circ\text{C}$.

11.16.4 After the test, the surfaces shall show no sign of rust. Traces of rust on sharp edges and a yellowish film removable by rubbing should be ignored.

11.17 Test for Tracking (Applicable to Moulded Insulating Materials Only) — This test when carried out shall be in accordance with IS : 2824-1975* and the tracking index shall be not less than 175.

*Method for determining comparative tracking index of solid insulating materials under moist conditions (*first revision*).

APPENDIX A*(Clause 11.1.2.1)***SAMPLING PROCEDURE****A-1. LOT**

A-1.1 In any consignment, all switches of the same type designation, rating and manufactured by the same factory under essentially similar conditions of production shall be grouped together to constitute a lot.

A-1.2 From each lot a number of switches as specified in Table 5 shall be selected at random and subjected to tests specified in **11.1.2**.

A-2. CRITERION FOR CONFORMITY

A-2.1 In Table 5, N_1 is the size of the first sample. If the number of failures found in this sample is less than or equal to C_1 , the lot shall be considered to be conforming to this standard and accepted. If the number of failures is greater than or equal to C_2 , the lot shall be rejected. If the number of failures is between C_1 and C_2 , further sample of N_2 pieces shall be taken and subjected to all tests. If the number of failures in the two samples combined is less than C_2 , the lot shall be accepted, otherwise rejected.

TABLE 5 SAMPLING PLAN*(Clauses A-1.2 and A-2.1)*

LOT SIZE	N_1	N_2	$(N_1 + N_2)$	C_1	C_2
51 to 100	10	20	30	0	3
101 „ 200	13	26	39	0	5
201 „ 300	20	40	60	1	5
301 „ 500	25	50	75	1	6
501 „ 800	35	70	105	2	7
801 „ 1 300	50	100	150	3	10
1 301 and above	75	150	225	5	12

NOTE — The plan recommended assures that lots with defectives 4 percent or less would be accepted most of the time, and lots with defectives 25 percent and above would be rejected most of the time. The exact consumer's risk depends on the lot size and it would be minimum when the lot size is maximum.

APPENDIX B

(Clause 11.12.1)

IMPACT TEST APPARATUS

B-1. DESCRIPTION OF THE TEST APPARATUS

B-1.1 A typical impact test apparatus is shown in Fig. 4.

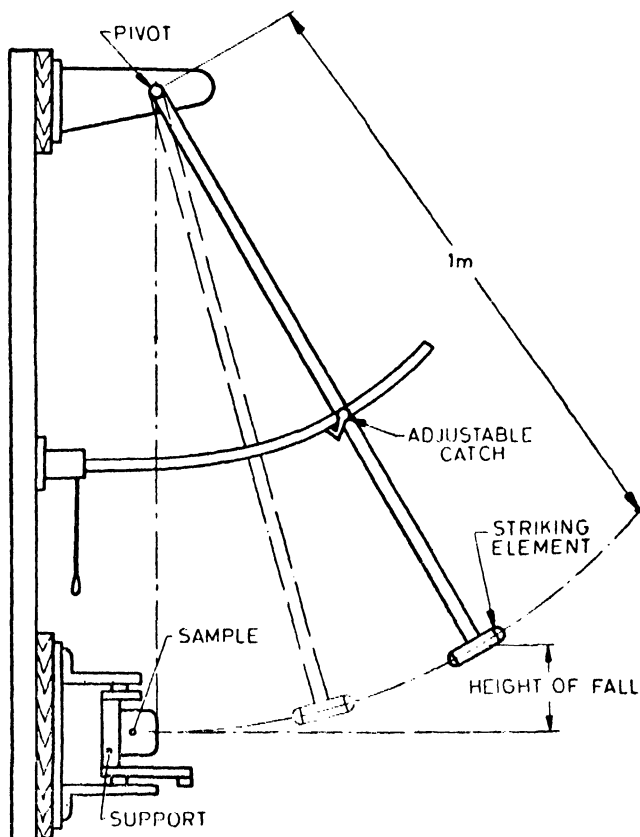
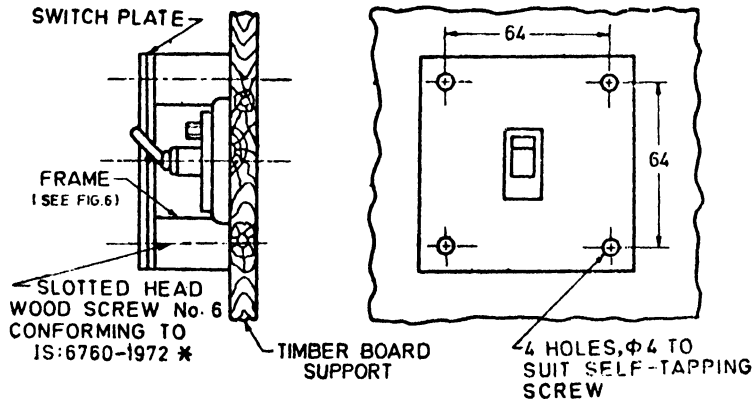


FIG. 4 IMPACT TEST APPARATUS

B-1.2 The pendulum consists of a steel tube with an external diameter of 9.0 mm and a thickness of 0.5 mm. It is suspended in such a way that it swings only in a vertical plane. A striking element weighing 0.15 kg is rigidly fixed to the lower end of the pendulum with its axis 1 m below the axis of suspension. The striking element has a hemispherical face made of hardwood, polyamide or the like, of hardness 80 to 100 Rockwell R scale.

B-1.3 The support for the sample shall be such that when the sample is placed the point of impact lies in a vertical plane through the suspension axis of the pendulum, and that the sample can be turned about an axis perpendicular to the support and about a vertical axis and can be moved horizontally and vertically.

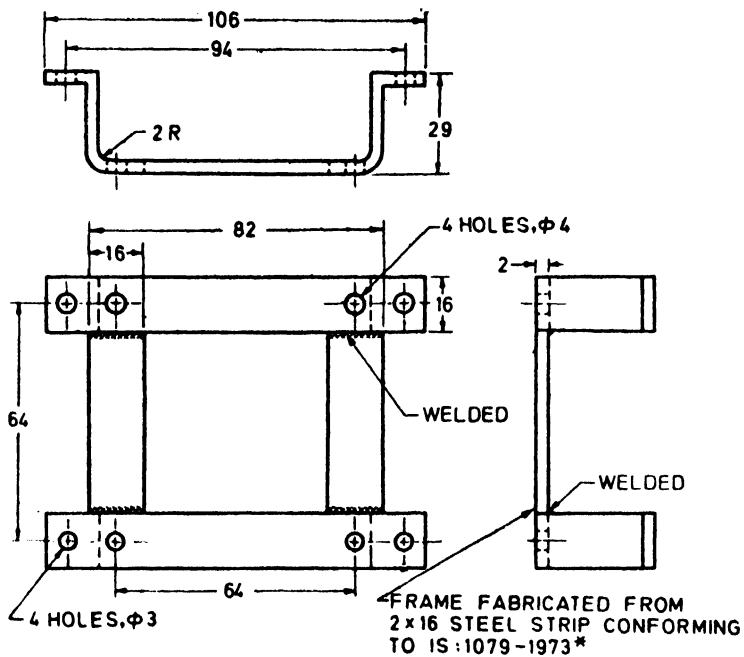
B-1.4 The sample is mounted on the support (see Fig. 5 and 6) as in normal use. Cable entries are left open. Fixing screws of basis and covers are tightened to two-thirds of the torque specified in Table 4.



*Specification for slotted countersunk head wood screws.

All dimensions in millimetres.

FIG. 5 DETAILS OF SWITCH MOUNTING ON IMPACT TEST APPARATUS



*Specification for hot rolled carbon steel sheet and strip (third revision).

All dimensions in millimetres.

FIG. 6 FRAME FOR MOUNTING SWITCH PLATE

AMENDMENT NO. 1 APRIL 1985

TO

IS:6965-1979 SPECIFICATION FOR SWITCHES FOR USE IN
RAILWAY COACHING STOCK

(*First Revision*)

(*Page 6, Fig. 1*):

- a) *Fig. 1A Switch* - Delete dimension '30' and substitute '40' for dimension '38.'
- b) *NOTE 1* - Substitute the following for the existing matter:

NOTE - 1 'ON' sign to be moulded/engraved on the dolly in such a way so that it is visible when the switch is in 'ON' position after the cover plate is fixed.

- c) *NOTE 5* - Substitute the following for the existing matter:

'The minimum clearance of 3 mm shall be maintained between switch plate and any live part. However, if metallic switch plate is used and clearance is less than 10 mm suitable insulation will be provided on the inside face of the switch plate.'

(*Page 9, clause 10.2*) - Substitute the following for the existing matter:

"The 'ON' sign moulded or engraved on the dolly of

the switch shall be clearly visible when the circuit is closed. The engraved (sunk-in) letters should be 4 mm high and 3 mm wide and shall be adequately deep and filled with white epoxy/acrylic based paint."

(Page 13, clause 11.9, line 3) - Substitute '12 500' for '25 000'.

(ETDC 44)

AMENDMENT NO. 2 OCTOBER 1989
TO
IS : 6965 - 1979 SPECIFICATION FOR
SWITCHES FOR USE IN RAILWAY COACHING
STOCK

(First Revision)

(Page 12, clause 11.6.1) — Substitute the following for the existing clause :

11.6.1 The switch shall be subjected to a moisture treatment for a period of 48 hours by keeping it in a humidity chamber in which the relative humidity is not less than 90 percent at a temperature between 15°C and 35°C.'

(Page 18, clauses 11.16.2 and 11.16.3) — Substitute the following for the existing clauses:

11.16.2 All greases shall be removed from the parts to be tested by immersion in carbon tetrachloride for 10 minutes. The parts shall then be immersed for 10 minutes in an aqueous solution of 10 percent ammonium chloride at a temperature between 15°C and 35°C.

11.16.3 Without drying, but after shaking off any drops of the solution, the parts shall then be placed for 10 minutes in a box containing air having relative humidity not less than 90 percent at a temperature between 15°C and 35°C. The samples shall then be dried for 10 minutes in a heating cabinet at a temperature of $100^{\circ}\text{C} \pm 5^{\circ}\text{C}$.'

(ETDC 44)

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